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10/802,087	03/16/2004	Ching-Yu Chang	2003-1435 / 24061.911	4048
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EXAMINER				
KO, STEPHEN K				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/802,087

**Applicant(s)**

CHANG ET AL.

**Examiner**

STEPHEN KO

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Upon further consideration, Election/Restriction is withdrawn. Claims 2-27 are currently pending in the application and examined on the merits.

### ***Double Patenting***

2. The double patenting rejection stated in office action dated 14th May 2008 has been withdrawn in view of applicants' amendment.

### ***Claim Objections***

3. Claim 26 is objected to because of the following informalities: Claim 26 recites "the second fluid comprises ozone (O<sub>2</sub>)" (L.1 of claim 26) is apparently should be written as "the second fluid comprises ozone (O<sub>3</sub>)". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 15-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Hazelton et al (US 2006/0023185).

Hazelton et al teach an apparatus comprising a working stage (read as means for positioning a wafer, abstract); a means for supplying an immersion liquid (Fig.10,

unlabeled, the pipe on the right of a valve #25) which is fully capable of supplying fluid containing no surfactant; a light projection optics with an optical element (read as means for performing a light exposing operation on a wafer using an objective lens immersed in the first fluid, Fig.10, unlabeled, the optical element #4 and the area above optical element #4); and a means for supplying a cleaning liquid (Fig.10, unlabeled, the pipe on top of a valve #25), which is fully capable of providing a surfactant to the immersion liquid to reduce an adherence of floating defects to the wafer or the optical element.

For claims 16 and 19, note that Hazelton et al teach a recovery nozzle (read as means for collecting the first and second fluid, Fig.10, #23).

For claims 17 and 18, since all the structures are found in the prior art, it is fully capable of performing the functions as recited in claims 17-18.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
9. Claims 2-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in view of Zhang et al (US 2005/0161644) in further view of Amblard et al (US 7,056,646).

For claims 6 and 8, Hazelton et al teach a method for cleaning an optical element (abstract, L. 12-13) related to an immersion lithography system comprising the steps of exposing a wafer under normal exposure condition (i.e. exposing wafer with light through the optical element in the presence of a first fluid, L. 5 of paragraph [0034]); and having the optical element brought into contact with cleaning liquid (read as second fluid, L.4 of paragraph [0035]) after exposure process. Note that apparently Hazelton et al does not explicitly teach the positioning step, however such step must be made in order to expose the wafer, which means that the step is implicitly in.

Hazelton et al remain silent about providing first fluid containing surfactant.

However, Zhang et al teach a step of providing an immersion fluid comprising a surfactant to minimize formation of micro-bubble (paragraph [0012]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Hazelton et al by providing a first fluid containing surfactant as mentioned in Zhang et al for to minimizing formation of micro-bubble (Zhang et al, paragraph [0012]).

Both Hazelton et al and Zhang et al do not teach a step of providing a second fluid having a higher surfactant concentration than the first fluid. Note that Hazelton et al discloses that any cleaning liquid may be used provided it has a sufficiently strong affinity to the liquid to be removed (Hazelton et al, L.8-9 of paragraph [0035]).

Amblard et al teach a step of providing a base developer to clean glass (col.3, L.5) comprising ethanol (col.3, L.12), ammonium hydroxide (col.3, L.18-19) and surfactants (col.4, L.27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of combined teaching of Hazelton et al and Zhang et al by providing a second fluid having surfactant as mentioned in Amblard et al since Hazelton et al disclose that any cleaning liquid may be used provided it has a sufficiently strong affinity to the liquid to be removed, and both ethanol; ammonium hydroxide and surfactant have strong affinity to water. Regarding a second fluid having a higher surfactant concentration than the first fluid, it is noted that concentration of the surfactant in the second fluid is result effective, because it affect the efficiency for cleaning the optical element (for example, concentration of soap (a kind of surfactant)

presented in a cleaning solution will affect the efficiency for cleaning), and one skilled in the art would modify different variables to achieve optimum result, consult, *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

For claim 2, note that the presence of photoresist is reasonably expected within the teaching of combined teaching of Hazelton et al, Zhang et al and Amblard et al since the wafer undergoes a light exposing operation, which projects image on the wafer.

For claim 3, note that the first fluid is an immersion lens when performing a light exposing operation.

For claim 4, note that the surfactant inherently reduce surface tension of the optical element with the first fluid.

For claim 5, note that the step of surfactant changing a surface property of the wafer to make it more hydrophilic is within the teaching of combined teaching of Hazelton et al; Zhang et al and Amblard et al since the surfactant reduce surface tension of a surface of the wafer and first fluid.

10. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in view of Zhang et al (US 2005/0161644) and Amblard et al (US 7,056,646) in further view of Krauschik (US 2004/0125351).

Hazelton et al, Zhang et al and Amblard et al teach a method for cleaning lens used in an immersion lithography system cited above.

Hazelton et al, Zhang et al and Amblard et al do not teach a step of providing the first fluid before starting the light exposing operation.

However, Krautschik teaches a step of immerse gap between lens element and substrate with an immersion liquid, before starting projecting image of reticle onto the substrate (read as providing the first fluid before starting the light exposing operation, Fig.5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of combined teaching of Hazelton et al, Zhang et al and Amblard et al by having a step of providing the first fluid before starting the light exposing operation as mentioned in Krautschik such that projected light can pass through the immersion liquid to perform immersion lithography, which enhance resolution.

11. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in view of Lyons et al (US 7,125,652) in further view of Amblard et al (US 7,056,646).

Hazelton et al teach a method for cleaning an optical element (abstract, L. 12-13) related to an immersion lithography system comprising the steps of exposing a wafer under normal exposure condition (i.e. exposing wafer with light through the optical element in the presence of a first fluid, L. 5 of paragraph [0034]); and having the optical element brought into contact with cleaning liquid (read as second fluid, L.4 of paragraph [0035]) after exposure process. Note that apparently Hazelton et al does not explicitly teach the positioning step, however such step must be made in order to expose the wafer, which means that the step is implicitly in.

Hazelton et al remain silent about the composition of the first fluid.



However, Lyons et al disclose it is well known to use de-ionized water as an immersion lithography medium when performing a light exposing operation (col.1, L.47-48).

It would have been obvious to one of ordinary skill in the art at the time the invention as made to modify the method of Hazelton et al by using de-ionized water as an immersion lithography mediums mentioned in Lyons et al since de-ionized water is cost efficiency and easy handling.

Both Hazelton et al and Lyons et al do not teach the second fluid comprising a surfactant-spiked water immersion fluid.

However, Amblard et al teach a step of providing a base developer to clean glass (col.3, L.5) comprising ethanol (col.3, L.12), ammonium hydroxide (col.3, L.18-19) and an ionic or non-ionic surfactants (col.4, L.27-28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of combined teaching of Hazelton et al and Lyons et al by providing a second fluid having surfactant as mentioned in Amblard et al since Hazelton et al disclose that any cleaning liquid may be used provided it has a sufficiently strong affinity to the liquid to be removed, and both ethanol; ammonium hydroxide and surfactant have strong affinity to water.

For claim 10, note that the presence of photoresist is reasonably expected within the teaching of combined teaching of Hazelton et al, Lyons et al and Amblard et al since the wafer undergoes a light exposing operation, which projects image on the wafer.

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in view of Lyons et al (US 7,125,652) in further view of Zhang et al (US 2005/0161644).

For claim 14, Hazelton et al and Lyons et al teach a method for cleaning an optical element. Note that the first and second fluids is inherently minimize micro-bubble since Zhang et al disclose presence of at least one additive such as surfactant or providing at least one carrier medium such as de-ionized water (Zhang et al, paragraph [0013]) without the addition of at least one additive will provide a benefit of minimizing the formation of micro-bubbles (Zhang et al, paragraph [0012]).

13. Claims 20-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in further view of Amblard et al (US 7,056,646).

Hazelton et al teach a method for cleaning an optical element (abstract, L. 12-13) related to an immersion lithography system comprising the steps of exposing a wafer under normal exposure condition (i.e. exposing wafer with light through the optical element in the presence of a first fluid, L. 5 of paragraph [0034]); and having the optical element brought into contact with cleaning liquid (read as second fluid, L.4 of paragraph [0035]) after exposure process. Note that apparently Hazelton et al does not explicitly teach the positioning step, however such step must be made in order to expose the wafer, which means that the step is implicitly in. Hazelton et al do not teach the second fluid comprising a surfactant and  $\text{NH}_4\text{OH}$ .

However, Amblard et al teach a step of providing a base developer to clean glass (col.3, L.5) comprising water (col.3, L.11), ethanol (col.3, L.12), ammonium hydroxide (col.3, L.18-19) and an ionic or non-ionic surfactants (col.4, L.27-28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of combined teaching of Hazelton et al and Lyons et al by providing a second fluid having surfactant as mentioned in Amblard et al since Hazelton et al disclose that any cleaning liquid may be used provided it has a sufficiently strong affinity to the liquid to be removed, and both ethanol; ammonium hydroxide and surfactant have strong affinity to water.

For claim 21, note that the presence of photoresist is reasonably expected within the teaching of combined teaching of Hazelton et al and Amblard et al since the wafer undergoes a light exposing operation, which projects image on the wafer.

14. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in further view of Amblard et al (US 7,056,646) in further view of Lyons et al (US 7,125,652).

Hazelton et al and Amblard et al teach a method for cleaning an optical element cited above.

Hazelton et al and Amblard et al do not teach the first fluid is a de-ionized water.

However, Lyons et al disclose it is well known to use de-ionized water as an immersion lithography medium when performing a light exposing operation (col.1, L.47-48).

It would have been obvious to one of ordinary skill in the art at the time the invention as made to modify the method of combined teaching of Hazelton et al and Amblard et al by using de-ionized water as an immersion lithography mediums mentioned in Lyons et al since de-ionized water is cost efficiency and easy handling.

15. Claims 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hazelton et al (US 2006/0023185) in further view of Amblard et al (US 7,056,646) in further view of Langford (US 5,443,801).

Hazelton et al and Amblard et al teach a method for cleaning an immersion lithography system cited above.

For claims 24-25 and 27, both Hazelton et al and Amblard et al do not teach a step of providing the second fluid comprising peroxide (H<sub>2</sub>O<sub>2</sub>).

However, Langford discloses a step of using a solution having hydrogen peroxide to disinfect an optical element (col.2, L.28-30).

Since it is well known that one particular problem of contaminants which can adversely affect the quality of the exposure pattern incident on the wafer is that growth of biological contaminants (e.g. bacteria, algae, etc) on parts that come in contact with an immersion fluid, one skill in the art would have been found obvious to add hydrogen peroxide into the second fluid of combined teaching of Hazelton et al and Amblard et al to control the presence of biological contaminants.

For claim 26, both Hazelton et al and Amblard et al do not teach a step of providing the second fluid comprising ozone (O<sub>3</sub>).

However, Langford teaches a step of using ozone bath to sterilize and clean an optical element (col.5, L.54-63).

Since it is well known that one particular problem of contaminants which can adversely affect the quality of the exposure pattern incident on the wafer is that growth of biological contaminants (e.g. bacteria, algae, etc) on parts that come in contact with an immersion fluid, one skill in the art would have been found obvious to add ozone (O<sub>3</sub>) into the second fluid of combined teaching of Hazelton et al and Amblard et al to control the presence of biological contaminants.

#### ***Response to Arguments***

16. Applicant's arguments with respect to claims 2-27 have been considered but are moot in view of the new ground(s) of rejection.

17. Regarding applicant's argument about Hazelton et al (2006/0023185) is not a prior art, because all the materials used for the rejection are found in provisional application 60/462,556 and 60/482,913; and the PCT application PCT/US2004/010309 is (1) designated to the United States, (2) published by the World Intellectual Property Organization, and (3) publication occurred in the English language, Hazelton et al is a prior art.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN KO whose telephone number is (571)270-3726. The examiner can normally be reached on Monday to Thursday, 7:30am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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